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SECTION I.—AEROLOGY.

THE TWILIGHT COLORING OF 1913.

The years 1912 and 1913 were notable in the history of our globe for several violent volcanic eruptions of the explosive type. The eruption of Katmai in Alaska in 1912 and its attendant meteorological phenomena has already been treated in the Monthly Weather Review for 1913, volume 41, page 153, and in the Mount Weather Bulletin, volumes 5 and 6. The eruption of Asama-Yama, Japan, on June 17, 1913, and of Sakura-Shima on January 11-12, 1914, have not yet been discussed here. It is possible that we shall not be able to discriminate between the effects due to the one and to the other of these three eruptions. In the first of the following notes Prof. Ignazio Galli describes the noteworthy twilight colorings observed by him at Rome during 1913. These he ascribes to the dust cloud from the Asama-Yama eruption. The second note by Prof. Kimball presents observations at Mount Weather for the same period; but he is not yet prepared to assign the phenomena to any definite eruption.

ITALIAN TWILIGHTS OF 1913.¹

By Prof. IGNAZIO GALLI.

[Dated Rome, Dec. 14, 1913.]

At 20h. 04m. [8:04 p. m.] July 13, 1913, I noticed that the northwestern sky was tinted a beautiful orange color with an extended base, later I saw the coloring increasing in intensity and becoming almost red toward the horizon. On the next day the same phenomena was repeated, but more weakly; on the evening of the 15th it returned with about the intensity that marked the glow of the 13th; and from the 16th to the 18th the intensity again diminished. On the evening of July 19, however, the atmospheric coloring at Rome was so splendid as to recall the celebrated twilights of the winter of 1883-84. On this date I wrote a letter published July 21-22, 1913, in the "Piccolo Giornale d'Italia," No. 202. For five months the phenomenon has continued with frequent variations in intensity, and only yesterday, December 13, it was very beautiful.

After July 19 the more vivid colorings appeared on the evenings of July 29, August 22, September 2, 5, 24, and 25, October 9 (through the clouds), and on November 29. On at least 24 other evenings the coloring was still very beautiful, a little later it was but moderate, and on occasions became weak or was almost absent.

In general, a few minutes after sunset the atmosphere about the horizon acquires a very strong white color which passes into a yellowish, and then into a decided yellow, into an orange hue, and finally turns to a more or less deep red. The yellow tint ordinarily begins 10 or 12 minutes after sunset, or a little earlier if the coloration is to become very beautiful.

The maximum height of 50 or 60 degrees, and sometimes even more, is almost always observed at the appearance of the yellow tint, with a horizontal extent of at

least 90 degrees. The greatest height endures for a couple of minutes, sometimes even four or five minutes, after which the glow slowly (a rapid rate is rare) shrinks until there remains but a great red zone along the horizon. This belt gradually dissolves, and after a few minutes disappears. The slow variations in color make it impossible to ascertain the exact moments of their beginnings and endings. I may state, however, that the average duration of the whole phenomenon from the yellow to the extinction of the red, varies between 20 and 25 minutes, while the most beautiful appearances lasted from 30 to 35 minutes.

After the entire disappearance of the red light a large area of the western sky remains a bright whitish or a rose color for another 40 to 50 minutes. Not rarely the sky just above the red zone on the horizon takes on a green color clearly distinguishable from the dark blue of the remainder of the vault. It may be thought that the ocular impression of a green is only a physiological phenomenon due to the contrast with the red of the lower band, and in the greater number of cases this is probably the fact. But it is quite certain that sometimes the green color of the sky persists for 15, even 20, minutes after the entire disappearance of the red band. I have also observed this same phenomenon during other periods of vividly colored twilights.

Although unfavorably situated since mid-October for observing the morning twilight, I have at times been in the open at about a half hour before sunrise, and I have always seen a more or less vivid rosy or orange coloring in the east, as might have been predicted.

TWILIGHT COLORS AT MOUNT WEATHER, VA., IN 1913.

By HERBERT H. KIMBALL, Professor of Meteorology.

[Dated Mount Weather, Va., Mar. 14, 1914.]

Early in August, 1913, the brilliancy of twilight colors both morning and evening attracted the attention of the observers at Mount Weather, Va. The colors reached a maximum brilliancy in September, but did not diminish noticeably until December. The following description of sunset colors for September 9, 1913, is characteristic of the twilight colors throughout this period:

Sun set about 6:30 p. m., seventy-fifth meridian time. The western horizon was then a brilliant orange, which increased in brilliancy until about 10 minutes after sunset, when a pink, or rose-colored glow appeared, extending from about 10° to 30° above the horizon, and for about 20° on each side of a vertical circle through the sun. This glow increased in brilliancy until about 20 minutes after sunset, and then gradually faded, disappearing about 30 minutes after sunset.

By this time the sky on the horizon for at least 60° on each side of the point of sunset was a brilliant red, shading off into bright yellow above, the latter color extending to a height of about 30°. At 7 p. m. the eastern sky was yellow, apparently on account of reflection from the western sky. The red on the western

¹ Extracted and translated from a reprint of his paper in *Atti, Pontif. acc. Romana dei Nuovi Lincei*, anno 67, Dec. 14, 1913.